

WHAT IS CLAIMED IS:

1 1. A method of preparing a nucleic acid array on a support, wherein
2 each nucleic acid occupies a separate known region of the support, said synthesizing
3 comprising contacting said support with protected nucleoside phosphoramidite monomers
4 having less than about 1 mole % of a phosphoramidite contaminant selected from the
5 group consisting of (MeO)(NCCH₂CH₂O)PN(iPr)₂, (MeO)P(N(iPr)₂)₂, (MeO)₂PN(iPr)₂,
6 and (NCCH₂CH₂O)₂PN(iPr)₂.

1 2. A method in accordance with claim 1, said synthesizing further
2 comprising:

3 (a) activating a region of the support;

4 (b) attaching a nucleotide to a first region, said nucleotide having a
5 masked reactive site linked to a protecting group;

6 (c) repeating steps (a) and (b) on other regions of said support whereby
7 each of said other regions has bound thereto another nucleotide comprising a masked
8 reactive site link to a protecting group, wherein said another nucleotide may be the same
9 or different from that used in step (b);

10 (d) removing the protecting group from one of the nucleotides bound to
11 one of the regions of the support to provide a region bearing a nucleotide having an
12 unmasked reactive site;

13 (e) binding an additional nucleotide to the nucleotide with an unmasked
14 reactive site;

15 (f) repeating steps (d) and (e) on regions of the support until a desired
16 plurality of nucleic acids is synthesized, each nucleic acid occupying separate known
17 regions of the support; and

18 wherein said phosphoramidite contaminant is present in an amount of less than
19 about 0.5 mole %.

1 3. A method in accordance with claim 1, wherein said synthesizing
2 comprises the sequential steps of:

3 a) generating a pattern of light and dark areas by selectively irradiating at
4 least a first area of a surface of a substrate, said surface comprising immobilized
5 nucleotides on said surface, said nucleotides capped with a photoremovable protective
6 group, without irradiating at least a second area of said surface, to remove said protective

group from said nucleotides in said first area;

b) simultaneously contacting said first area and said second area of said surface with a first nucleotide to couple said first nucleotide to said immobilized nucleotides in said first area, and not in said second area, said first nucleotide capped with said photoremovable protective group;

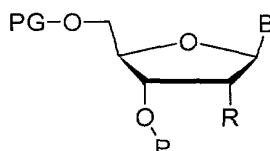
c) generating another pattern of light and dark areas by selectively irradiating with light at least a part of said first area of said surface and at least a part of said second area to remove said protective group in said at least a part of said first area and said at least a part of said second area;

d) simultaneously contacting said first area and said second area of said surface with a second nucleotide to couple said second nucleotide to said immobilized nucleotides in at least a part of said first area and at least a part of said second area;

e) performing additional irradiating and nucleotide contacting and coupling steps so that a matrix array of at least 100 nucleic acids having different sequences is formed on said support.

4. A method in accordance with claim 1, wherein said contaminant is present in an amount of less than about 0.2 mole %.

5. A method in accordance with claim 1, wherein said protected nucleoside phosphoramidite monomers have the formula:



wherein

B is a member selected from the group consisting of adenine, guanine, thymine, cytosine, uracil and analogs thereof;

R is a member selected from the group consisting of hydrogen, hydroxy, protected hydroxy, halogen and alkoxy;

P is a phosphoramidite group; and

PG is a photoremoveable protected group.

6. A method in accordance with claim 5, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine and R is hydrogen.

1 7. A method in accordance with claim 5, wherein said array
2 comprises at least 10 different nucleic acids.

1 8. A method in accordance with claim 5, wherein said array
2 comprises at least 100 different nucleic acids.

1 9. A method in accordance with claim 5, wherein said array
2 comprises at least 1000 different nucleic acids.

1 10. A method in accordance with claim 5, wherein said array
2 comprises at least 10,000 different nucleic acids.

1 11. A method in accordance with claim 5, wherein said array
2 comprises at least 100,000 different nucleic acids.

1 12. A method in accordance with claim 5, wherein each different
2 nucleic acid is in a region having an area of less than about 1 cm².

1 13. A method in accordance with claim 5, wherein each different
2 nucleic acid is in a region having an area of less than about 1 mm².

1 14. A method in accordance with claim 5, wherein said
2 phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

1 15. A method in accordance with claim 5, wherein B is selected from
2 the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, and said
3 phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

1 16. A method in accordance with claim 5, wherein B is selected from
2 the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is
3 MeNPOC and said phosphoramidite contaminant is present in an amount of less than 0.2
4 mole %.

1 17. A method in accordance with claim 5, wherein B is selected from
2 the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is
3 MeNPOC, P is -P(OCH₂CH₂CN)N(iPr)₂ and said phosphoramidite contaminant is
4 present in an amount of less than 0.2 mole %.

- 1 **18.** A nucleic acid array prepared by the method of claim **1**.
- 1 **19.** A nucleic acid array prepared by the method of claim **5**.
- 1 **20.** A nucleic acid array prepared by the method of claim **17**.

11/01/2011 10:00:00 AM